

What is claimed is:

Version with markings to show changes made

1. A process for embedding supplemental digital data into a pre-prepared compressed digital media file, that comprises, encoding the compressed digital media file as a set of coefficient representations of the pre-prepared media file information; and embedding portions of the supplemental digital data at selected coefficients to produce a media file containing such embedded data for enabling user decoding and playback of both the pre-prepared media file information and the embedded supplemental data.
2. A process for embedding supplemental digital data into a pre-prepared digital media file, that comprises, transforming the media file into encoded sets of frequency-domain coefficient representations of the pre-prepared media file information and compressing the file; selecting predetermined coefficient sets; and embedding bits of the supplemental digital data at selected coefficients to produce a supplemental data file containing such embedded data for enabling user decoding and playback of both the pre-prepared media file information and the embedded supplemental data.
3. The process of claim 2 wherein the coefficients are prepared by discrete transforms selected from the group consisting of Fourier, Cosine, Sine and Wavelet transforms.
4. The process of claim 2 wherein the embedding step uses the least-significant bit of the selected coefficients.
5. The process of claim 4 wherein the selected coefficients are chosen at regular intervals.



6. The process of claim 4 wherein said coefficients are selected as one of or both frequency and phase coefficients.
7. The process of claim 4 wherein single bits of data are embedded by computing the parity of the least-significant bits of a group of said coefficients. *Must use minimum form*
8. The process of claim 7 wherein a perceptual encoding technique is used to select which of a group of said coefficients is to be modified by data embedding.
9. The process of claim 8 wherein said parity of the least-significant bits of said group of coefficients embeds a bit of data, while minimizing the effect on said user's perception of the media file playback.
10. The process of claim ~~2~~⁷ wherein said playback preserves backwards compatibility of the apparatus used for such playback. ✓
11. The process of claim ~~2~~⁷ wherein steganographic encoding is employed in which the data is transformed into a bit stream, and locations are selected in the media file information where the insertion and embedding of supplemental data bits produce minimal effects in the perception of the user during said playback. ✓
12. The process of claim 11 wherein said insertion and embedding is effected at the least-significant bit of selected coefficients.
13. The process of claim ~~2~~⁷ wherein digital watermarking is applied to the media file information prior to the embedding of the supplemental data. ✓
14. The process of claim ~~2~~⁷ wherein steganographic encoding is employed in which the data is transformed into a bit stream; sets of coefficients are selected to encompass a range of frequencies in the media file information; and, for each bit

- in the bit stream, the selected coefficients and the next bit to be encoded are combined to rescale the coefficients and encode such bit as embedded.
15. The process of claim 14 wherein the media file information is selected to be at least one of audio, image, video, 2D and 3D spline datapoints, and volumetric data files.
 16. The process of claim 15 wherein the media file information is at least one of audio and video information in an MPEG format.
 17. The process of claim 15 wherein the media file information is image file information in a JPEG format.
 18. The process of claim 15 wherein the spline data is one of Bezier curves and NURBS.
 19. The process of claim 15 wherein the volumetric data is compressed by using a 3D transformation.
 20. The process of claim 7 wherein the media file contains one of audio, image, video, 2D and 3D splines, volumetric and multimedia information. ✓
 21. A system for embedding supplemental digital data into a pre-prepared digital media file having, in combination, encoding means for transforming the media file information into sets of frequency-domain coefficient representations of the pre-prepared media file information and for compressing the file; means for selecting predetermined coefficient sets; and further encoding means for embedding bits of the supplemental digital data at selected coefficients to produce a supplemented media file containing such embedded data for enabling user ✓

- decoding and playback on playback apparatus of both the pre-prepared media file information and the embedded supplemental data.
22. The system of claim ²¹ wherein the media file information is selected from the group consisting of audio, image, video, 2D and 3D splines, volumetric and multimedia information.
23. The system of claim 22 wherein the first-named encoding means prepares said coefficients by one of Fourier, Cosine, Sine and Wavelet transforms.
24. The system of claim ²⁷ wherein, in operation, the further encoding means uses the least-significant bit of the selected coefficients.
25. The system of claim 24 wherein the selected coefficients are chosen at regular intervals.
26. The system of claim 24 wherein said coefficients are selected as one of or both frequency and phase coefficients.
27. The system of claim 24 wherein the further encoding means embeds single bits of data by computing the parity of the least-significant bits of a group of said coefficients.
28. The system of claim 27 wherein a perceptual encoding technique is used to select which of a group of said coefficients is to be modified by data embedding.
29. The system of claim 28 wherein the further encoding means responds to said parity of the least-significant bits of said group of coefficients to embed a bit of data, while minimizing the effect on said user's perception of the media file playback.

Parity
into
embedder
form

30. - The system of claim 21 wherein said playback preserves backwards compatibility of the playback apparatus.